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# Incomplete Reflections: Addressing Potential Bias in Digital Curation

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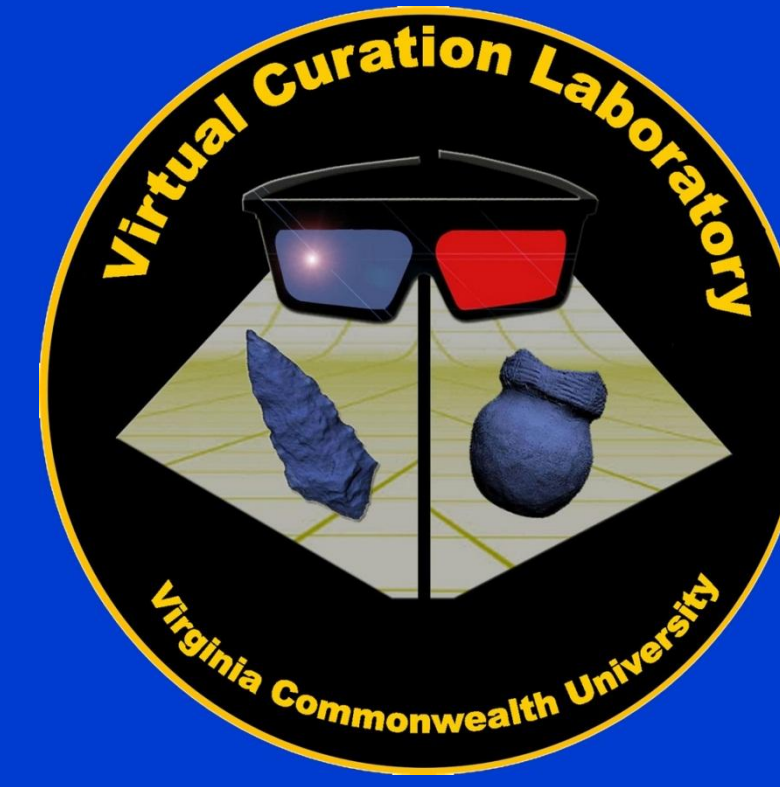




# Incomplete Reflections: Addressing Potential Bias in Digital Curation

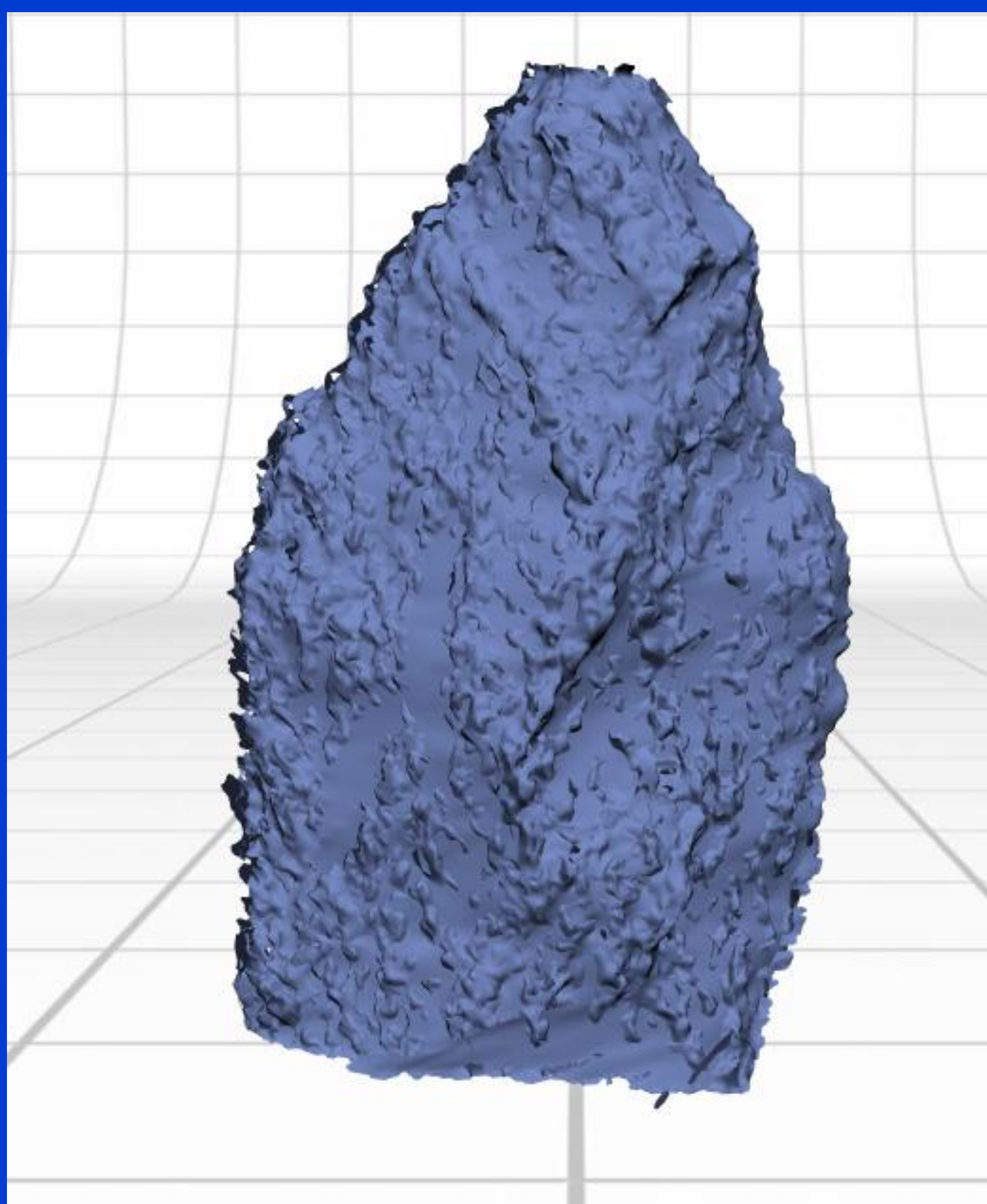
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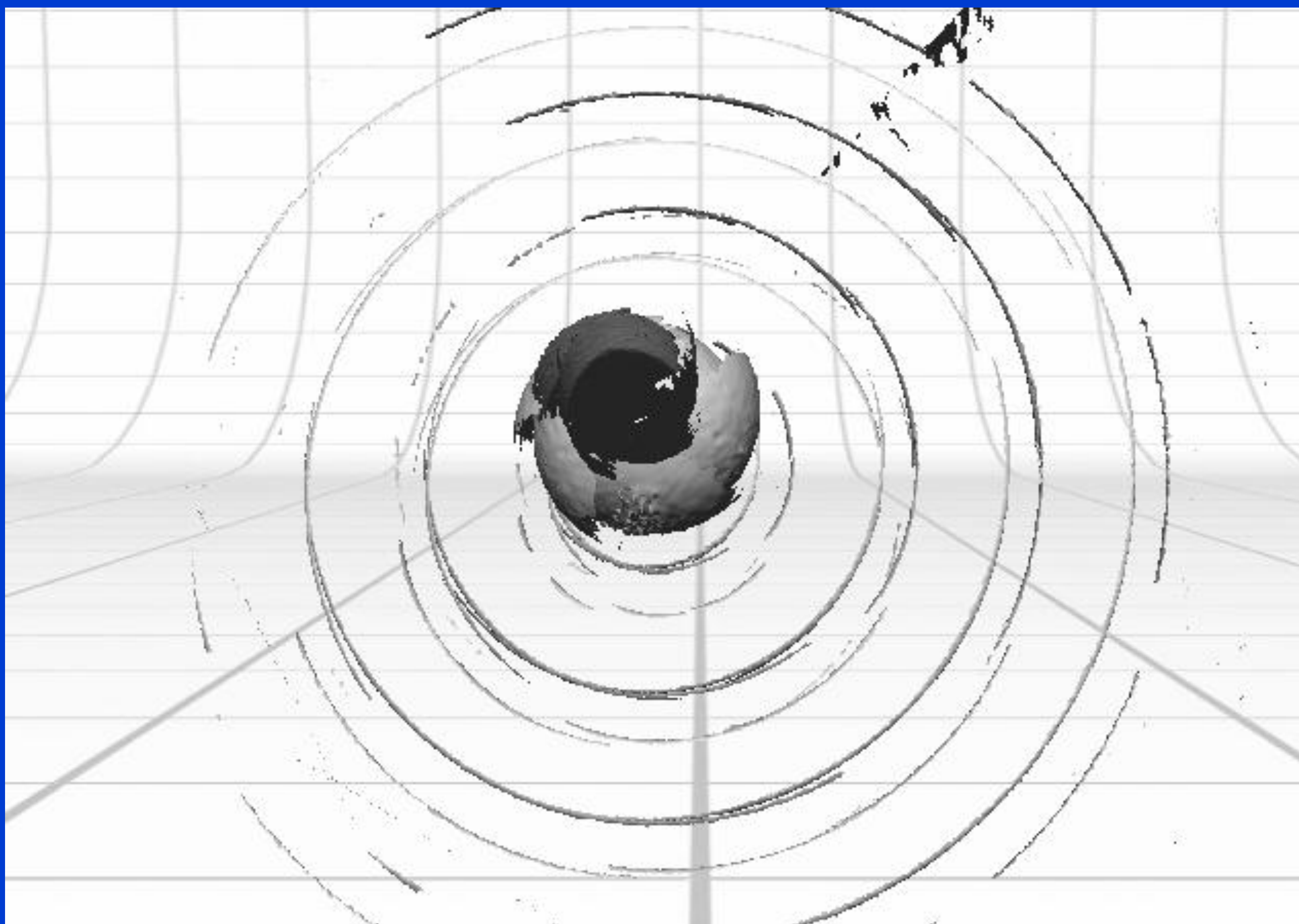
## Introduction

Digital scanning technology offers many benefits to archaeology and curation in its ability to preserve virtual representations of artifacts in databases without harming the object. However, various selective pressures may limit which artifacts are digitally curated. The material of an artifact or details on an object's surface may prevent it from scanning properly. Scans which inaccurately portray the surface detail of an artifact may be ignored by those who edit and process the files in favor of a more attractive scan. Scanning efforts designed for public outreach may favor certain artifacts over others. These selective pressures may produce unintentional bias in the digital artifact databases, which could potentially limit the applicability to certain scopes of archaeological research.



## Bad Scans Make Bad Models

3D scanning comes with a range of limitations. Our laboratory's scanning equipment frequently experiences unexpected glitches that could be attributed to issues with the software or with the scanner itself. Some artifacts are inexplicably unscannable. For instance, the VCL has successfully scanned a number of quartz flakes, but the scanner will not scan a subset of these nearly identical flakes even after retrying. Additionally, a number of Iroquoian effigies we have scanned have a distorted surface and are ignored when selecting which files to process in favor of more accurate scans. Some of these problems may be caused by the scanner not picking up the grooves on incised pottery, but scanning issues are rampant even with relatively smooth objects. Some of the less attractive scans are salvageable if a digital model of a particular artifact is greatly desired, but working with bad scans is much more time consuming than working with more accurate ones. Using the suite of programs available in the VCL, it may take as long as an hour to scan an artifact and three hours processing the files; this does not include re-starting failed scans or programs unexpectedly failing, which is an all too frequent nuisance. Other scans can be entirely unworkable, which effectively removes these artifacts from our database. The Virtual Curation Lab has scanned well over 700 artifacts, and the list of new scans to work on is ever growing. If newer, better scans are unprocessed, then lab technicians are less likely to choose more difficult tasks unless other needs drive them.



## Differential Representation

Not all artifacts that have been scanned by the Virtual Curation Lab have been fully processed as digital models. Because lab technicians may freely choose which files they wish to work on, some artifacts may be ignored in favor of more accurate scans, scans of artifacts important or desirable to the technician, or artifacts that are best suited to 3D printing. This may cause an inaccurate representation of our database. Sherds and vessels decorated with effigies, for instance, are somewhat inaccurately represented. 26.81% of the sherds and vessels we have scanned have effigies on them, but only 14% of STL (STereoLithographic) files of sherds have effigies. This discrepancy may be caused by the bad quality which is associated with many of the scans of effigy sherds. However, the majority of the sherds that the VCL has printed are face sherds because these are more recognizable when replicated in plastic and are presumably more interesting to laypeople. Differential representation is especially apparent in the 3D printing aspect of work in the Virtual Curation Lab. While the digital models may hold interest for professionals, plastic replicas are targeted mainly for the general public. Artifacts of interest to the public may differ from those pertinent to researchers. While an expert could recognize incised Iroquoian pottery lacking an effigy, a model—digital or plastic—would not intrigue a novice because it would be an unrecognizable mass. For example, lab technicians recently developed a projectile point typology workshop for archaeology students at VCU. Though only 12.02% of STL files are projectile points, 47.91% of all plastic replicas in the VCL are points. Thus, the goals of the project drive what is produced in the lab.



## Ignoring Older Files

A great number of artifacts have not been processed into STL files; many of those are from many months ago. 65.61% of artifacts scanned before November 2012 have not been made into STLs. 48.60% of artifacts scanned before May 2012 are still not STLs.

The high instance of unprocessed, early scans may be attributed to new workers and methods in the lab. Because of the turnover of interns and volunteers in the VCL, artifacts that were scanned earlier in the span of the project may not be processed after new technicians replace old ones. These new workers may wish to process files that they have scanned themselves. Scanning norms have also changed since the beginning of the project. Many early scans have 16 panels instead of 12, which is the default number used now. More panels causes file sizes to be bigger and more likely to require additional time and effort; thus older scans are more difficult with which to work.



## Conclusion

Bias is a hurdle to overcome in the projects at the Virtual Curation Lab. Because the NextEngine Scanner used by the VCL may produce unattractive scans, technicians may be more likely to edit more accurate files. Time management is important because there are so many scan files to process, so older files are often ignored in favor of newer ones. Additionally, the audience of 3D printing may limit the scope artifacts represented. These issues must be acknowledged if 3D scanning technology is to be implemented in archaeology as a whole.

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